Construct a **multi-track TM** that accepts the language:

$$L(M) = \{a^n b^n c^n \mid n \geq 0\}$$

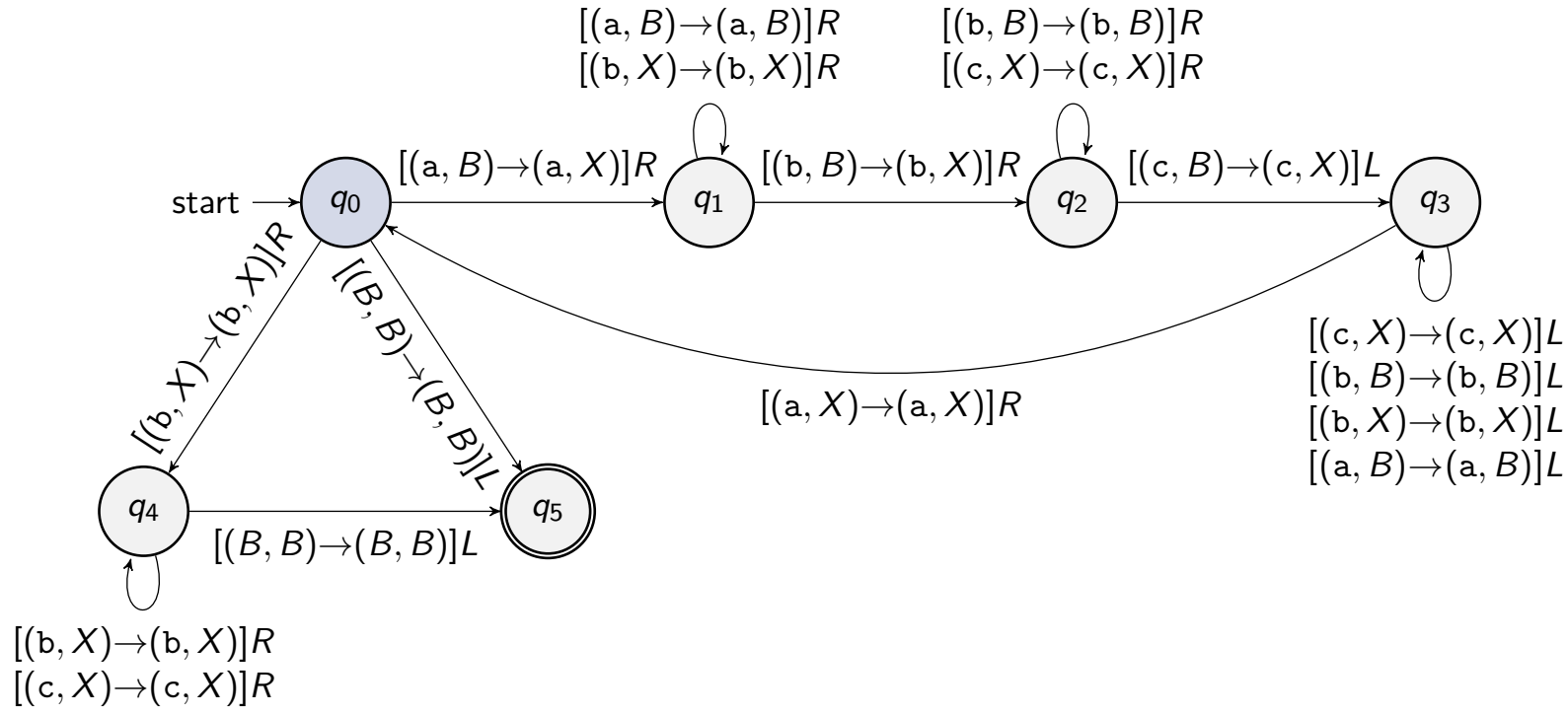
$\cdots$	B	a	a	b	b	c	c	B	$\cdots$
$\cdots$	B	B	B	B	B	B	B	B	$\cdots$

1: **while** there are unmarked a's **do**
2: Mark the first unmarked a with X
3: Mark the first unmarked b with X
4: Mark the first unmarked c with X
5: Check if all symbols are marked

Construct a **multi-track TM** that accepts the language:

$$L(M) = \{a^n b^n c^n \mid n \geq 0\}$$

$\cdots$	B	a	a	b	b	c	c	B	$\cdots$
$\cdots$	B	B	B	B	B	B	B	B	$\cdots$

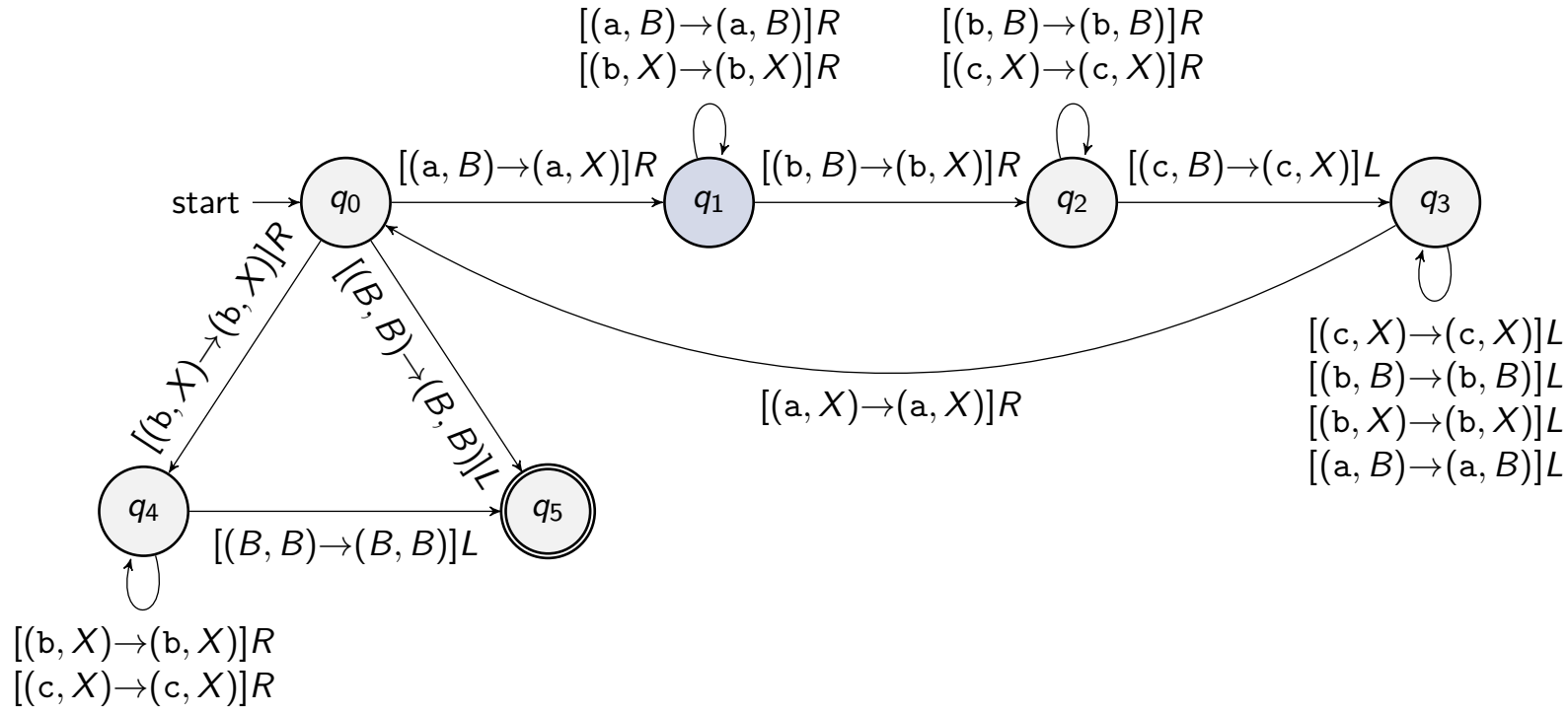


Mark the first unmarked a with X.

Construct a **multi-track TM** that accepts the language:

$$L(M) = \{a^n b^n c^n \mid n \geq 0\}$$

$\cdots$	B	a	a	b	b	c	c	B	$\cdots$
$\cdots$	B	X	B	B	B	B	B	B	$\cdots$

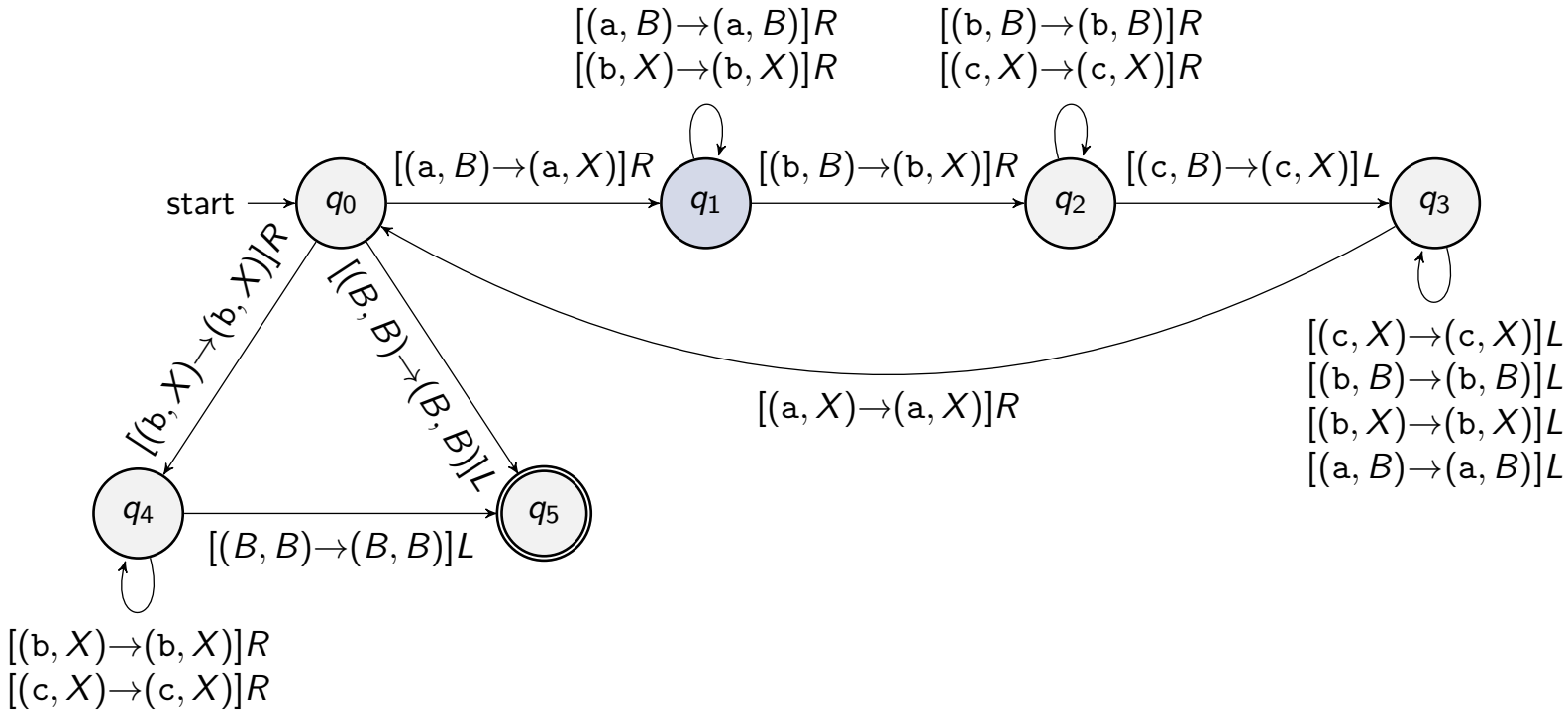


Mark the first unmarked b with X.

Construct a **multi-track TM** that accepts the language:

$$L(M) = \{a^n b^n c^n \mid n \geq 0\}$$

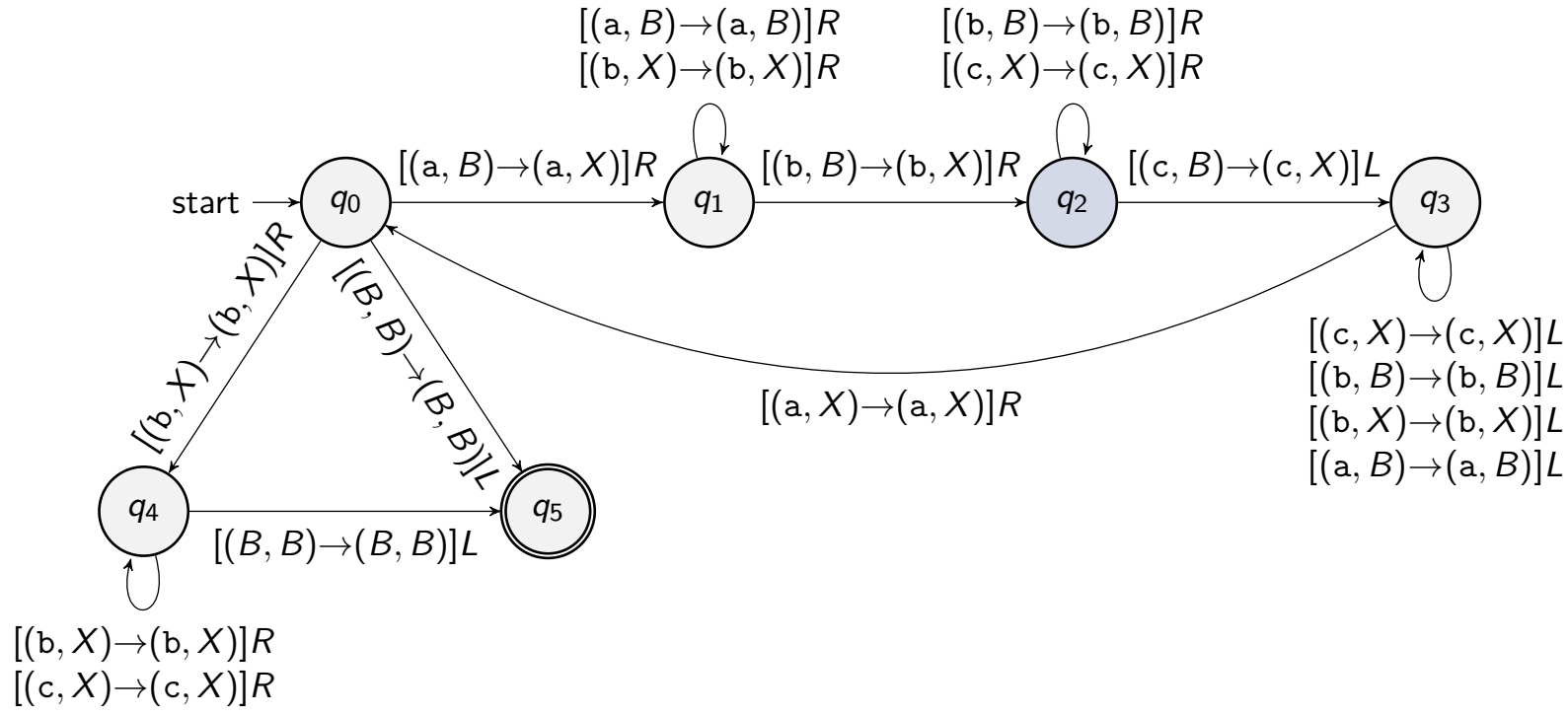
$\cdots$	B	a	a	b	b	c	c	B	$\cdots$
$\cdots$	B	X	B	B	B	B	B	B	$\cdots$



Construct a **multi-track TM** that accepts the language:

$$L(M) = \{a^n b^n c^n \mid n \geq 0\}$$

$\cdots$	B	a	a	b	b	c	c	B	$\cdots$
$\cdots$	B	X	B	X	B	B	B	B	$\cdots$

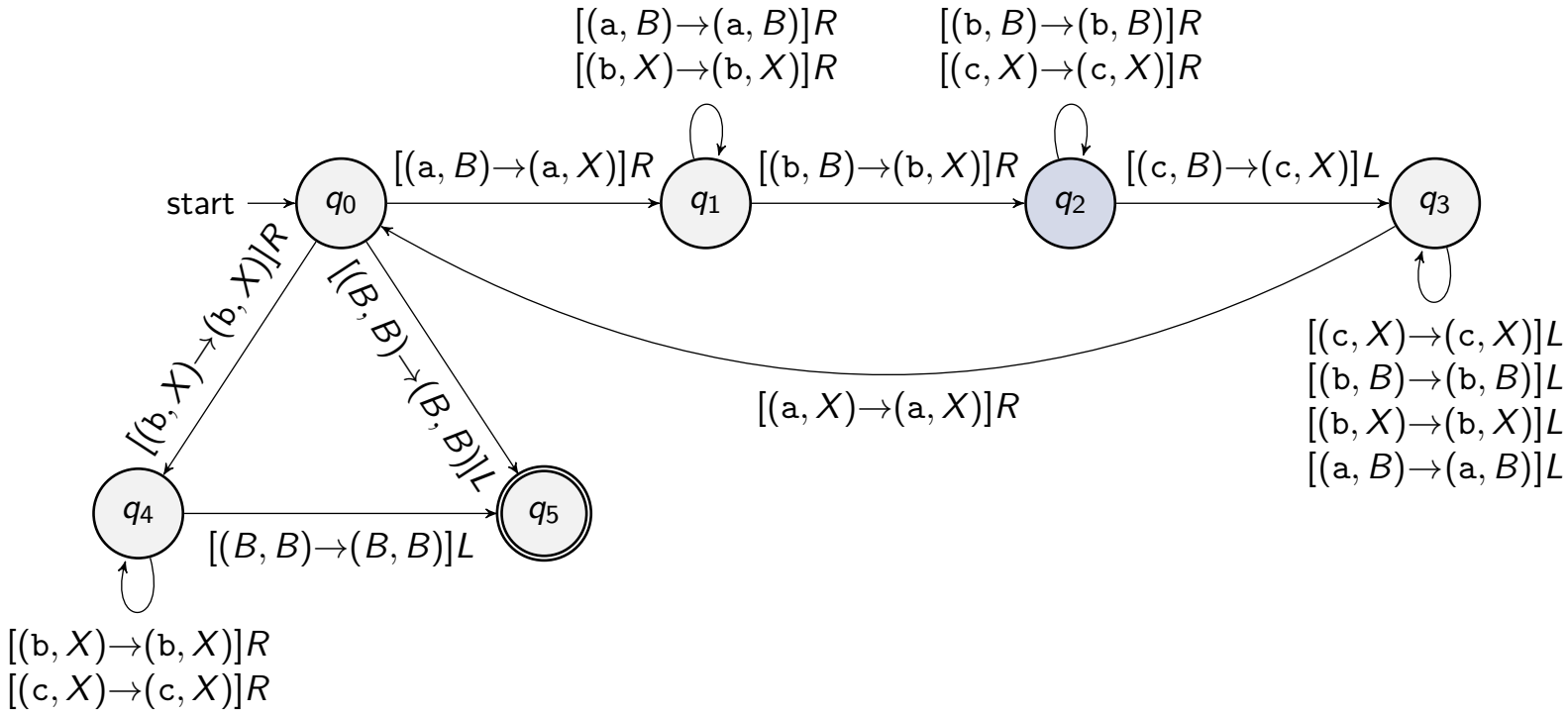


Mark the first unmarked c with X.

Construct a **multi-track TM** that accepts the language:

$$L(M) = \{a^n b^n c^n \mid n \geq 0\}$$

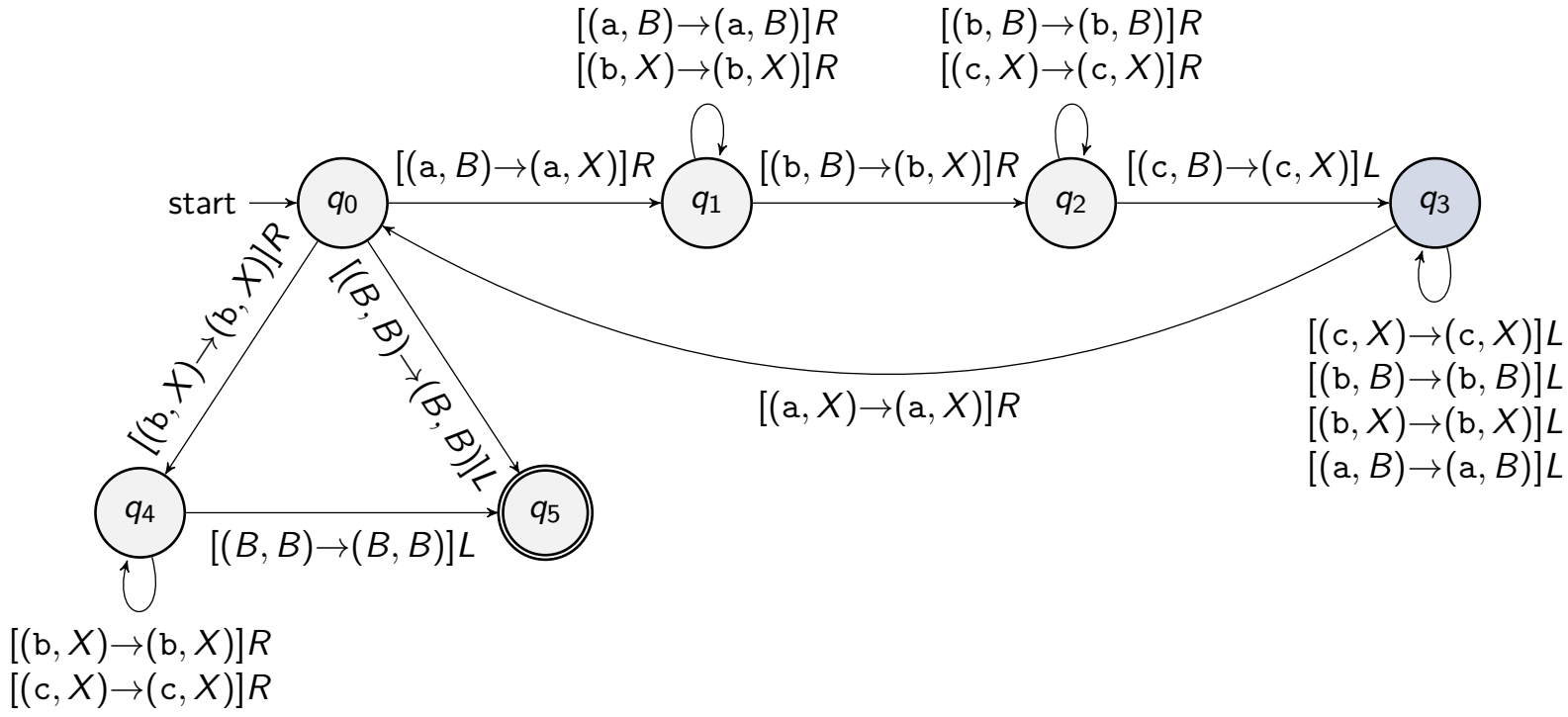
$\cdots$	B	a	a	b	b	c	c	B	$\cdots$
$\cdots$	B	X	B	X	B	B	B	B	$\cdots$



Construct a **multi-track TM** that accepts the language:

$$L(M) = \{a^n b^n c^n \mid n \geq 0\}$$

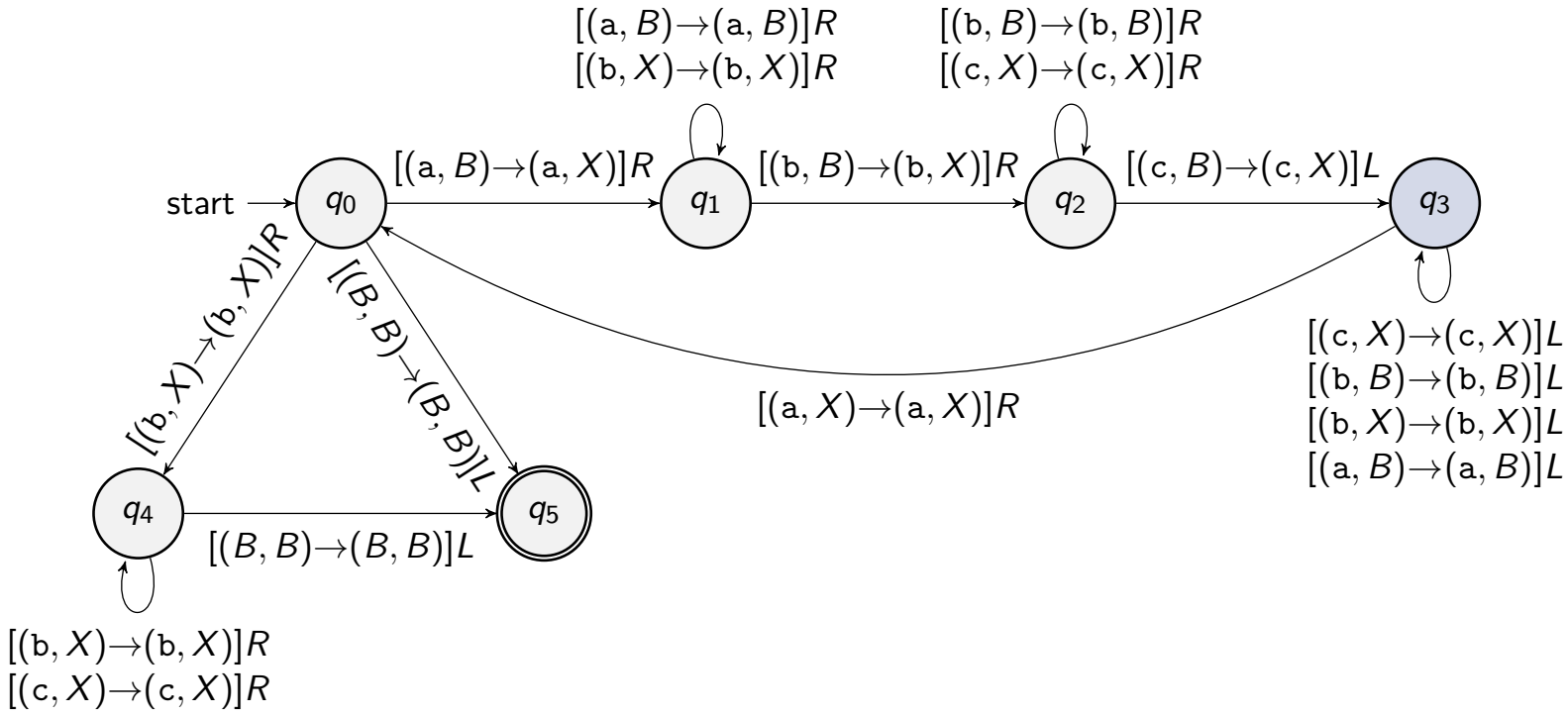
$\cdots$	B	a	a	b	b	c	c	B	$\cdots$
$\cdots$	B	X	B	X	B	X	B	B	$\cdots$



Construct a **multi-track TM** that accepts the language:

$$L(M) = \{a^n b^n c^n \mid n \geq 0\}$$

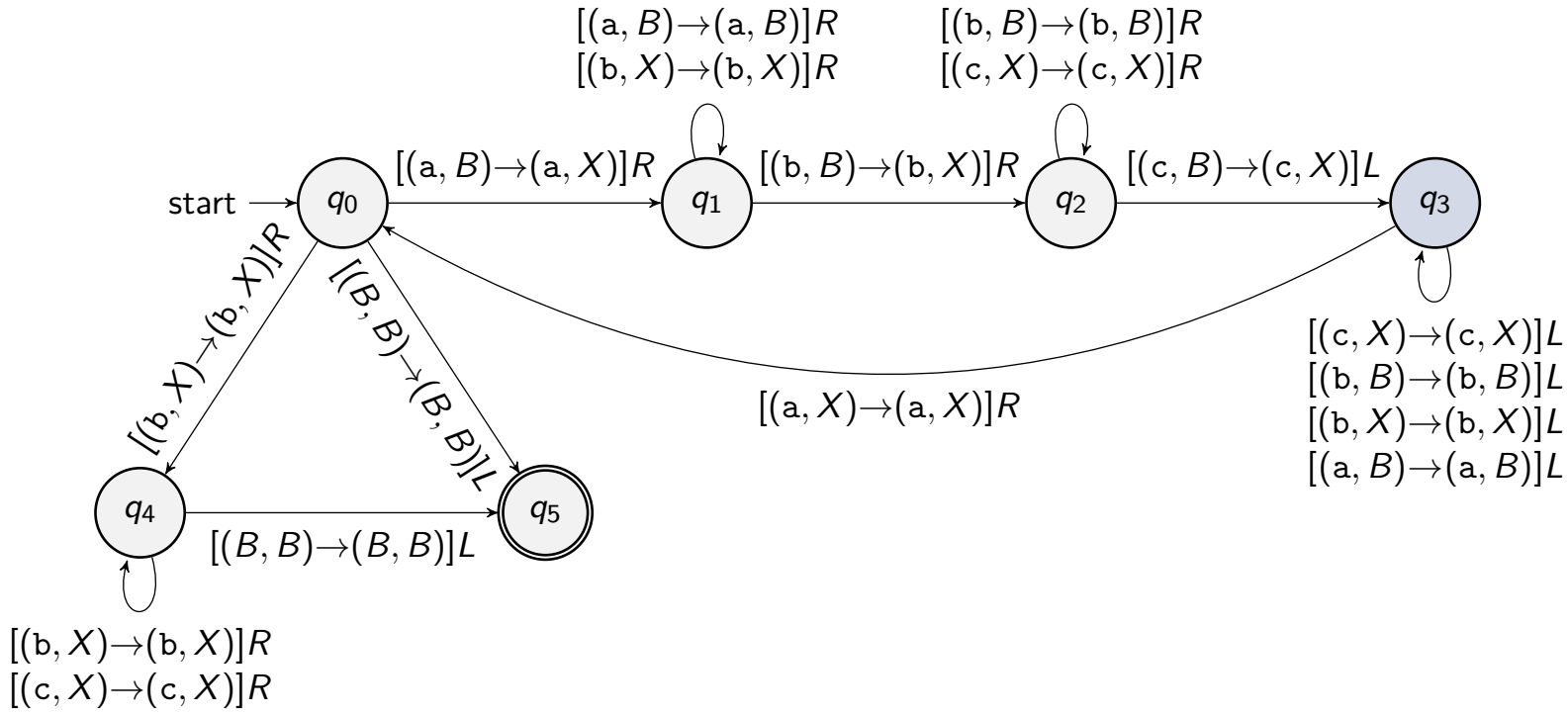
$\cdots$	B	a	a	b	b	c	c	B	$\cdots$
$\cdots$	B	X	B	X	B	X	B	B	$\cdots$



Construct a **multi-track TM** that accepts the language:

$$L(M) = \{a^n b^n c^n \mid n \geq 0\}$$

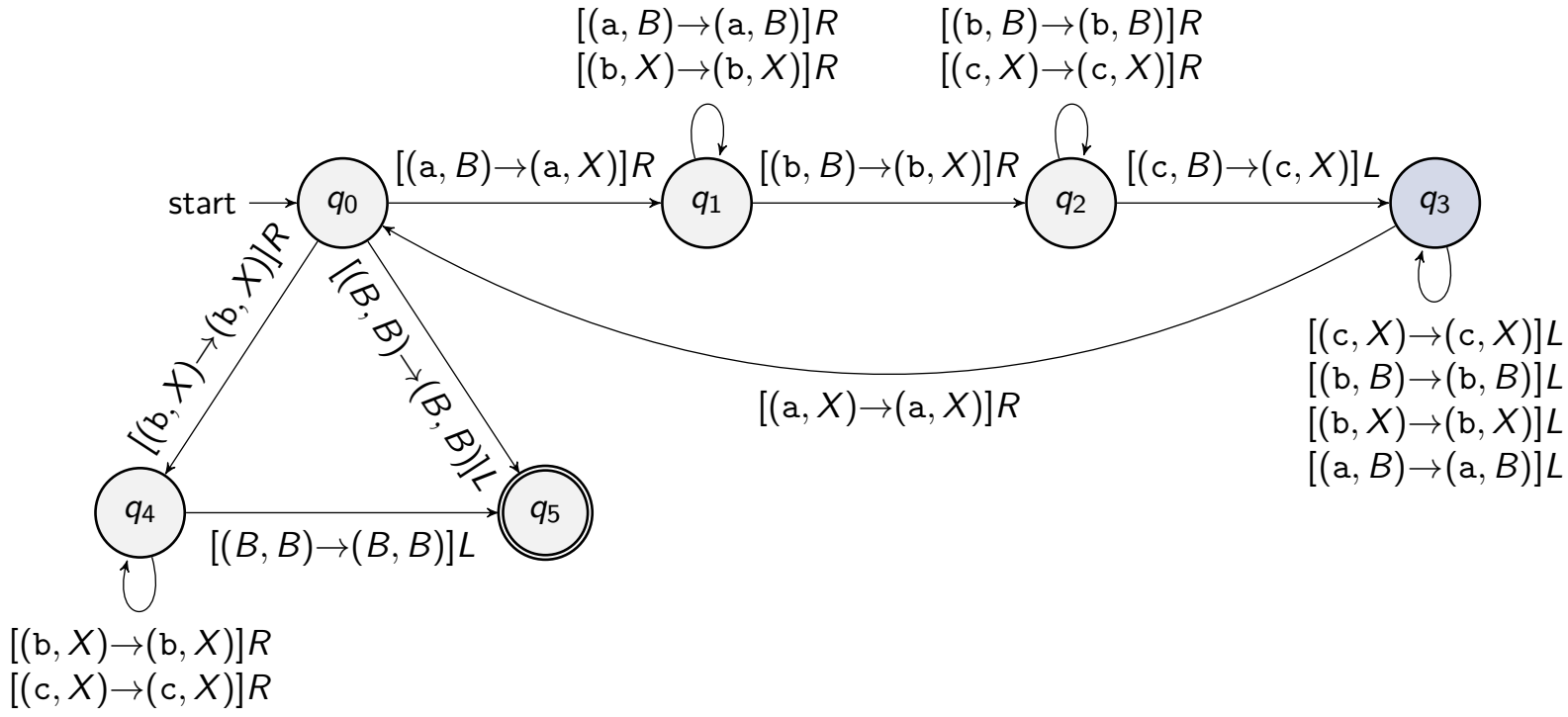
$\cdots$	B	a	a	b	b	c	c	B	$\cdots$
$\cdots$	B	X	B	X	B	X	B	B	$\cdots$



Construct a **multi-track TM** that accepts the language:

$$L(M) = \{a^n b^n c^n \mid n \geq 0\}$$

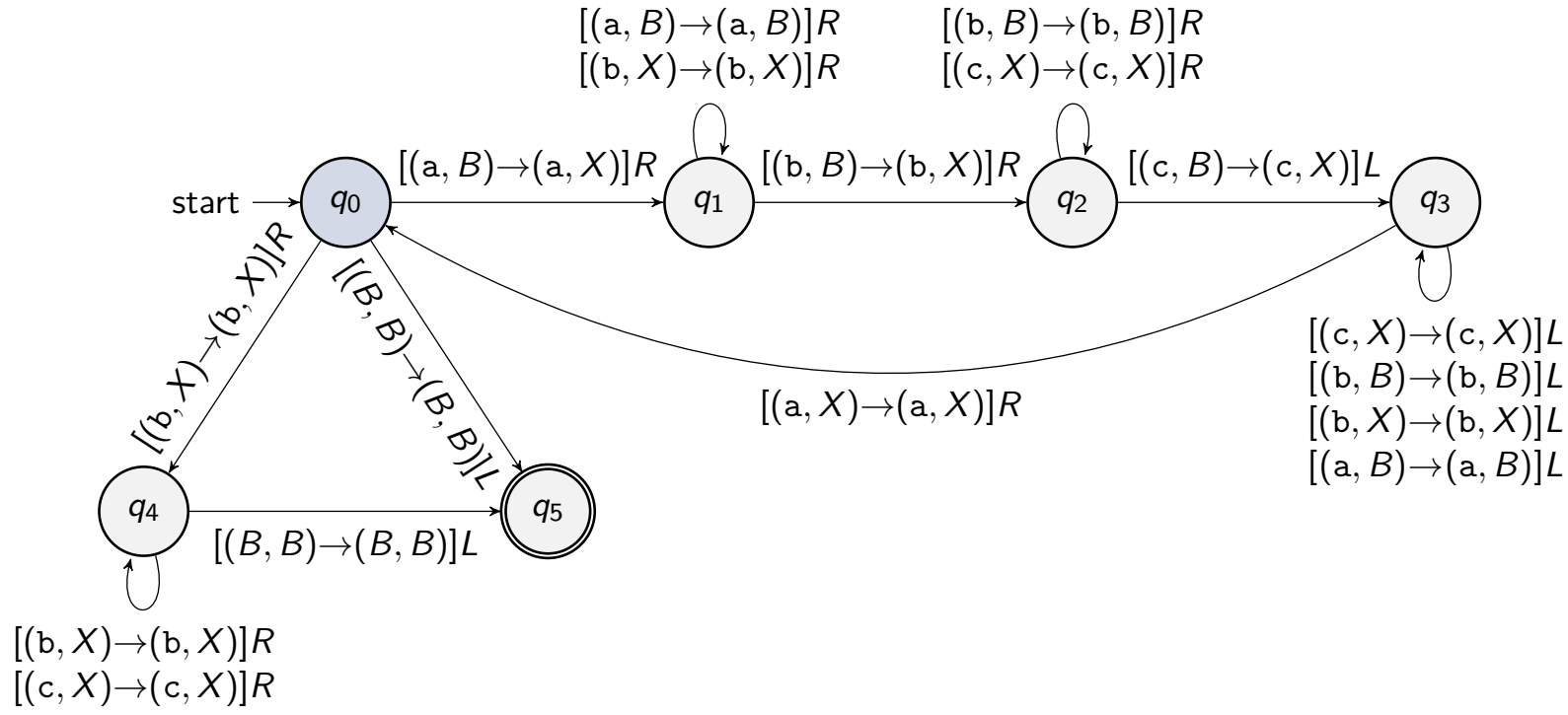
$\cdots$	B	a	a	b	b	c	c	B	$\cdots$
$\cdots$	B	X	B	X	B	X	B	B	$\cdots$



Construct a **multi-track TM** that accepts the language:

$$L(M) = \{a^n b^n c^n \mid n \geq 0\}$$

$\cdots$	B	a	a	b	b	c	c	B	$\cdots$
$\cdots$	B	X	B	X	B	X	B	B	$\cdots$

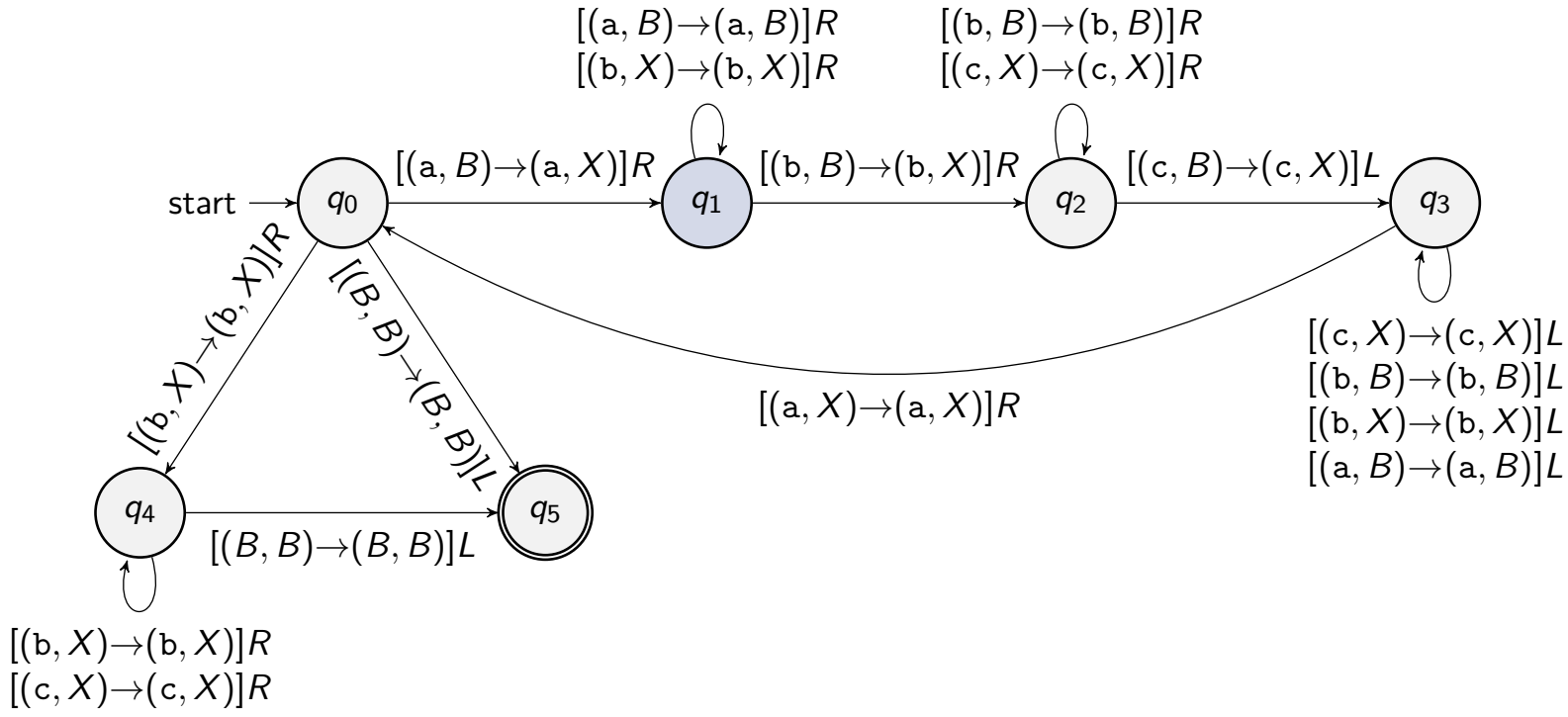


Repeat until all a's are marked.

Construct a **multi-track TM** that accepts the language:

$$L(M) = \{a^n b^n c^n \mid n \geq 0\}$$

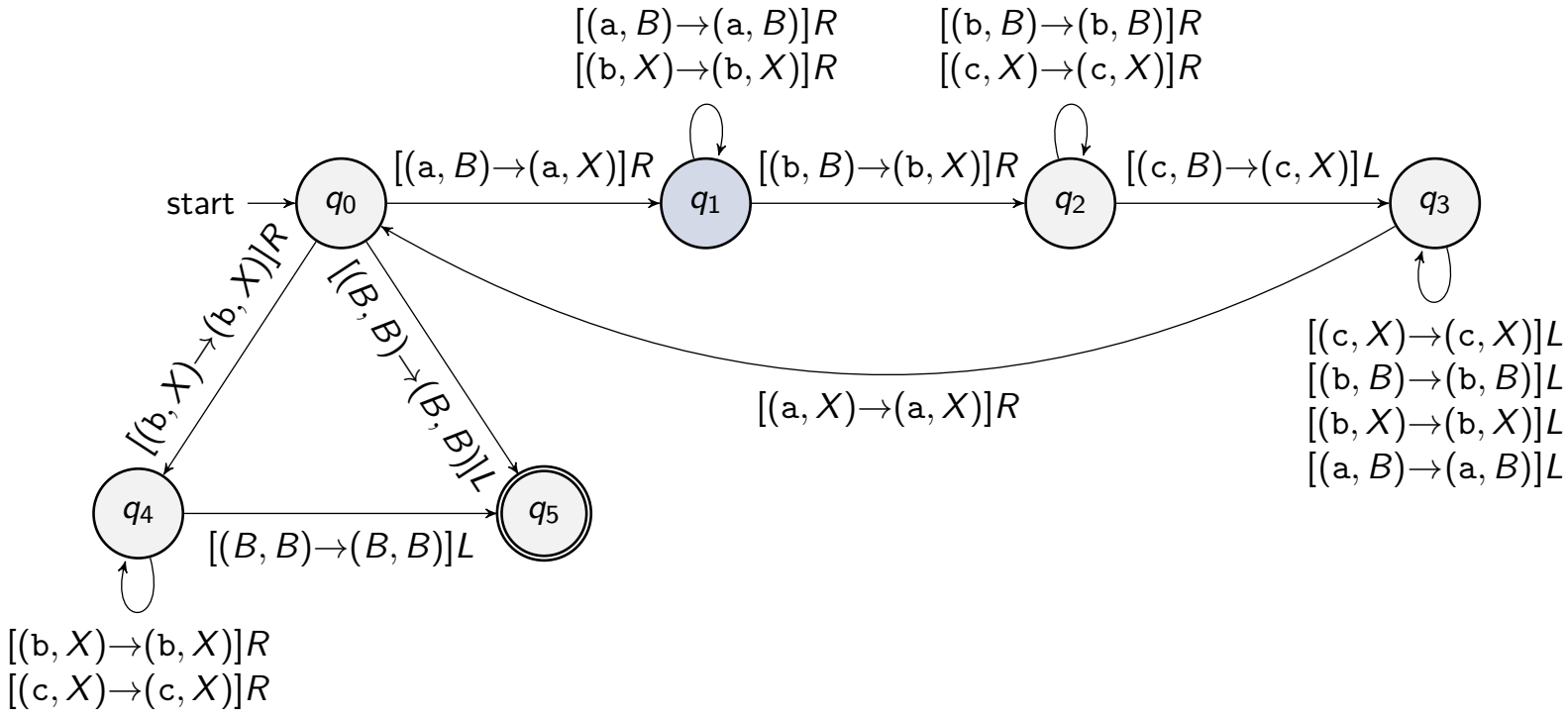
$\cdots$	B	a	a	b	b	c	c	B	$\cdots$
$\cdots$	B	X	X	X	B	X	B	B	$\cdots$



Construct a **multi-track TM** that accepts the language:

$$L(M) = \{a^n b^n c^n \mid n \geq 0\}$$

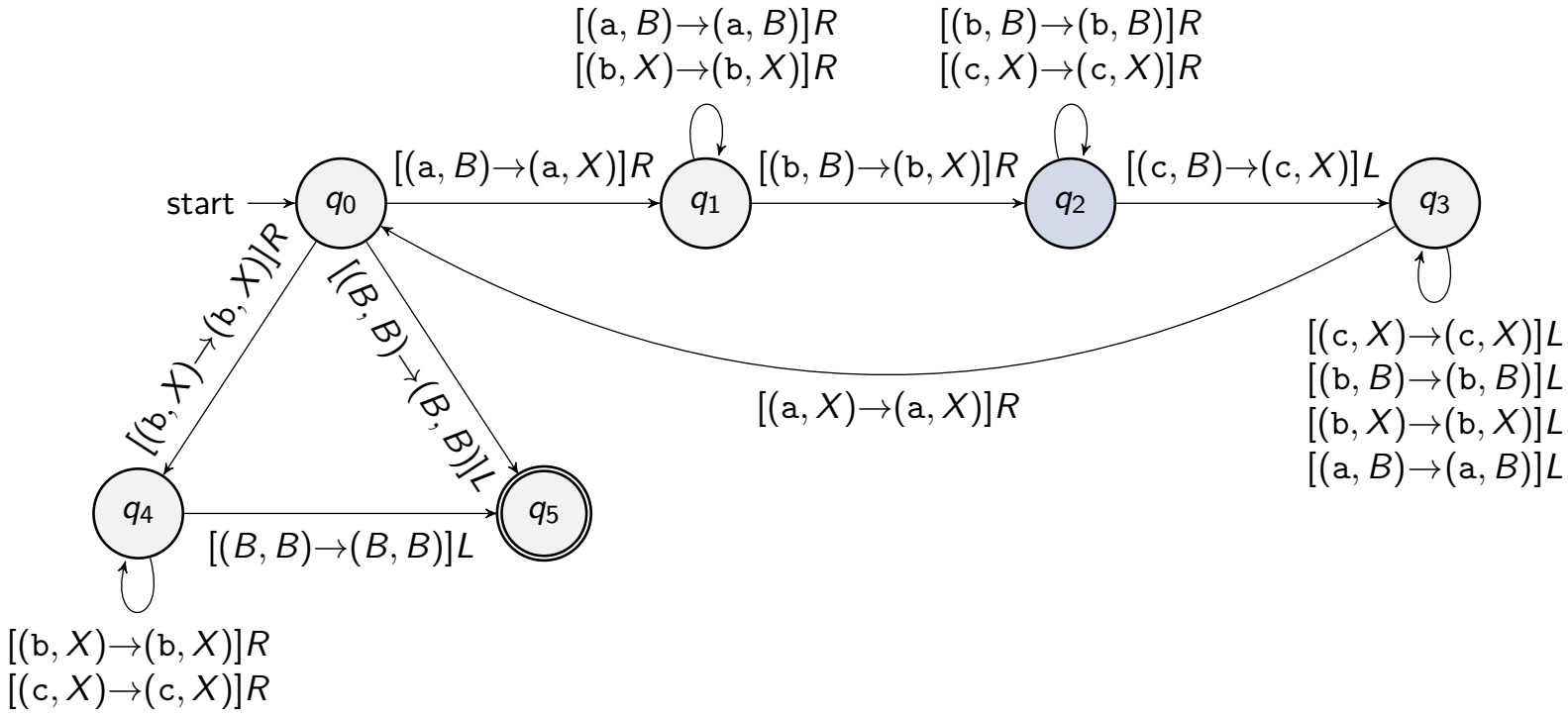
$\cdots$	B	a	a	b	b	c	c	B	$\cdots$
$\cdots$	B	X	X	X	B	X	B	B	$\cdots$



Construct a **multi-track TM** that accepts the language:

$$L(M) = \{a^n b^n c^n \mid n \geq 0\}$$

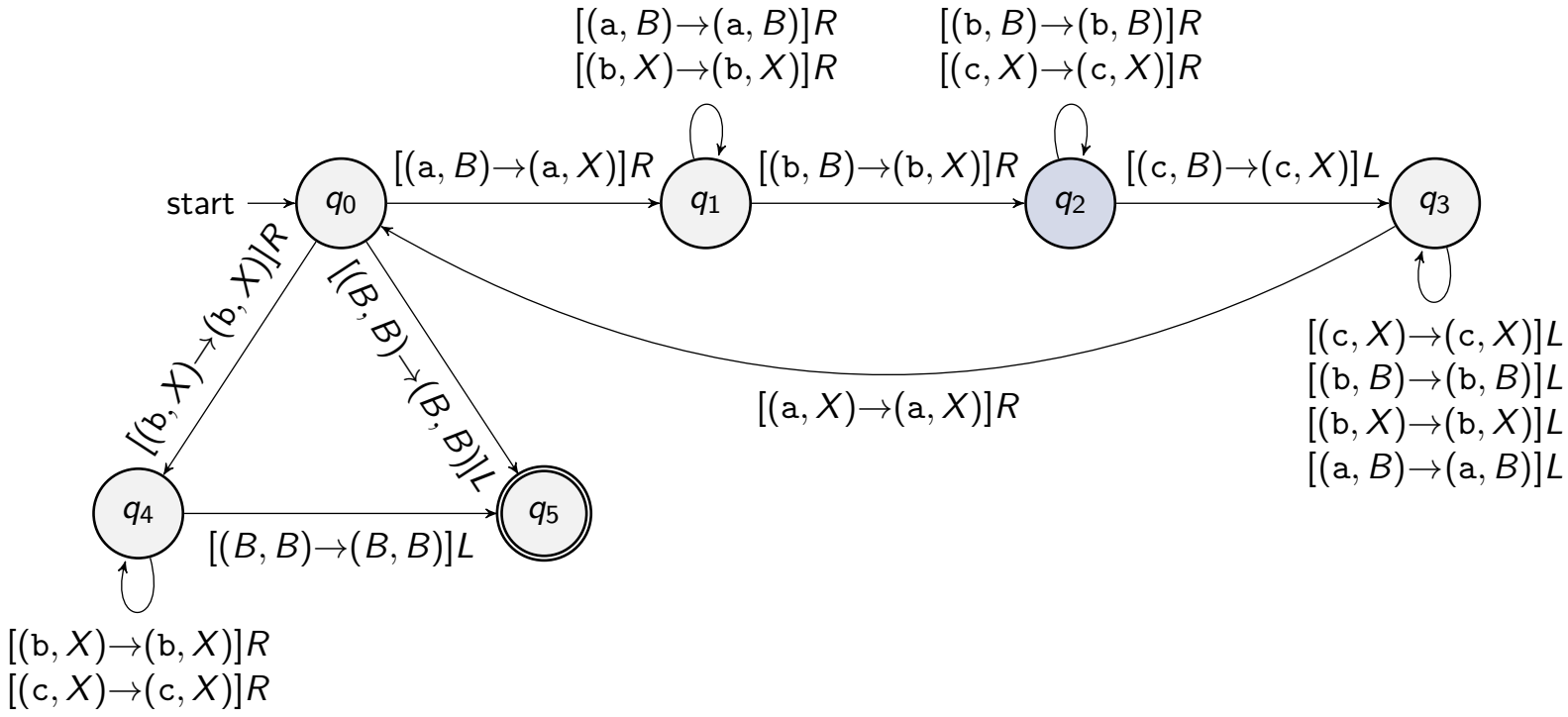
$\cdots$	B	a	a	b	b	c	c	B	$\cdots$
$\cdots$	B	X	X	X	X	X	B	B	$\cdots$



Construct a **multi-track TM** that accepts the language:

$$L(M) = \{a^n b^n c^n \mid n \geq 0\}$$

$\cdots$	B	a	a	b	b	c	c	B	$\cdots$
$\cdots$	B	X	X	X	X	X	B	B	$\cdots$



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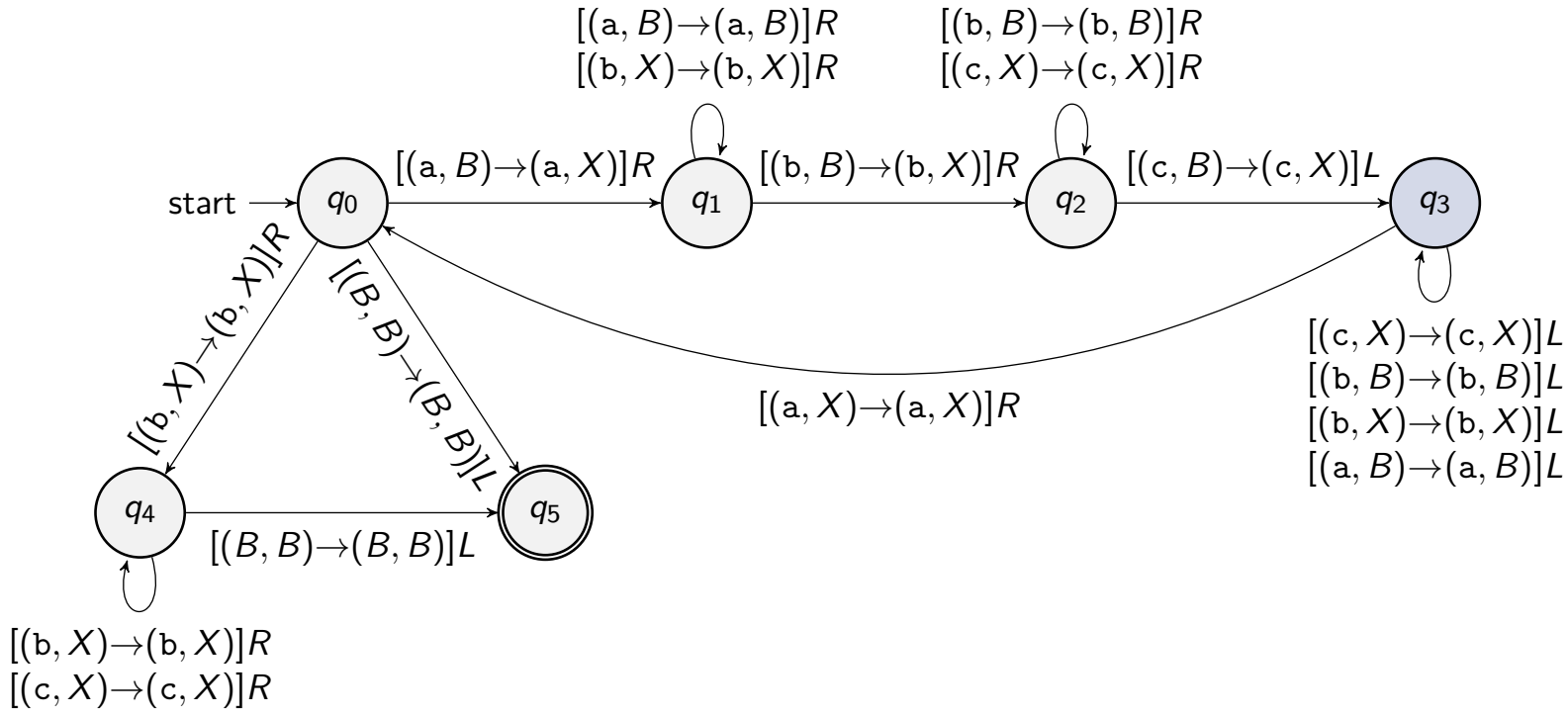
$$L(M) = \{a^n b^n c^n \mid n \geq 0\}$$

$\cdots$	B	a	a	b	b	c	c	B	$\cdots$
$\cdots$	B	X	X	X	X	X	X	B	$\cdots$



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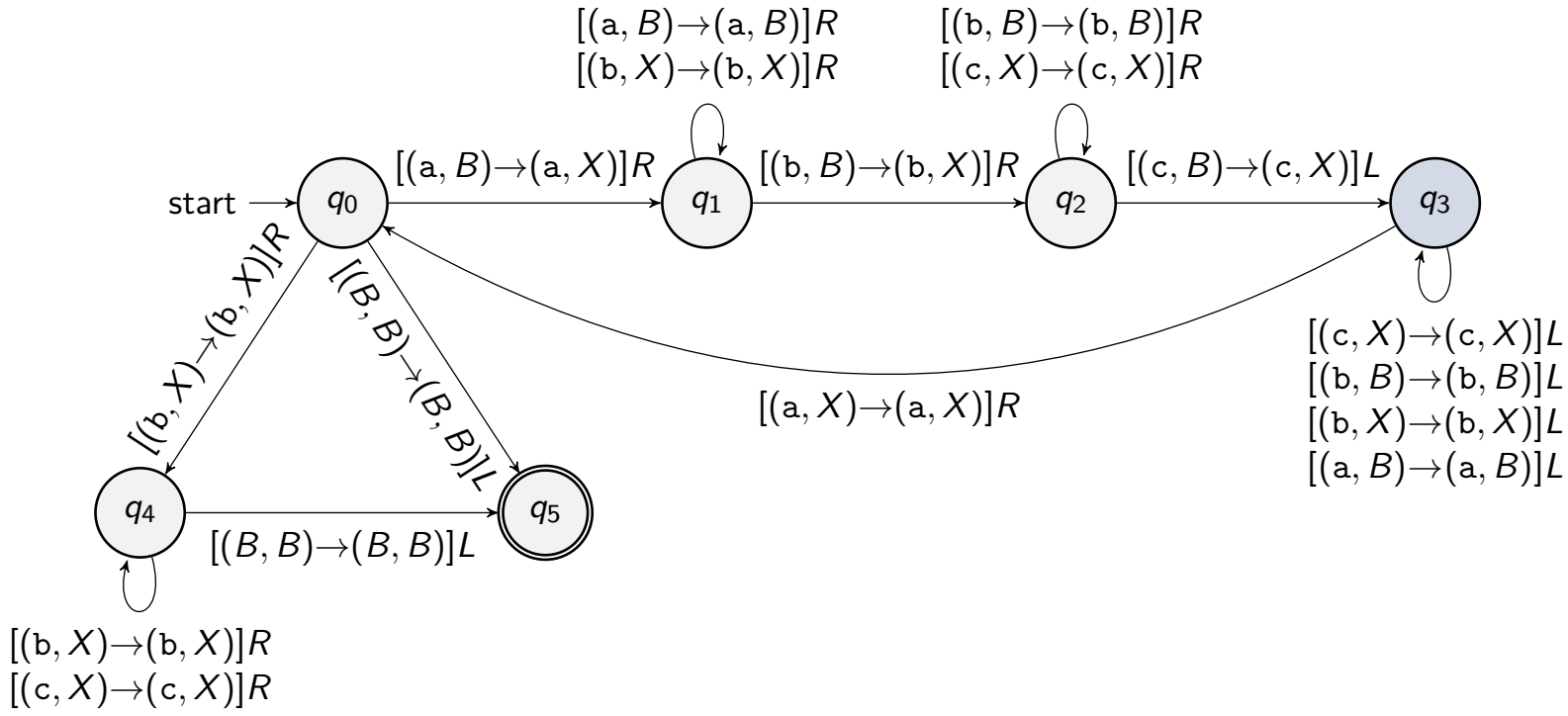
$$L(M) = \{a^n b^n c^n \mid n \geq 0\}$$

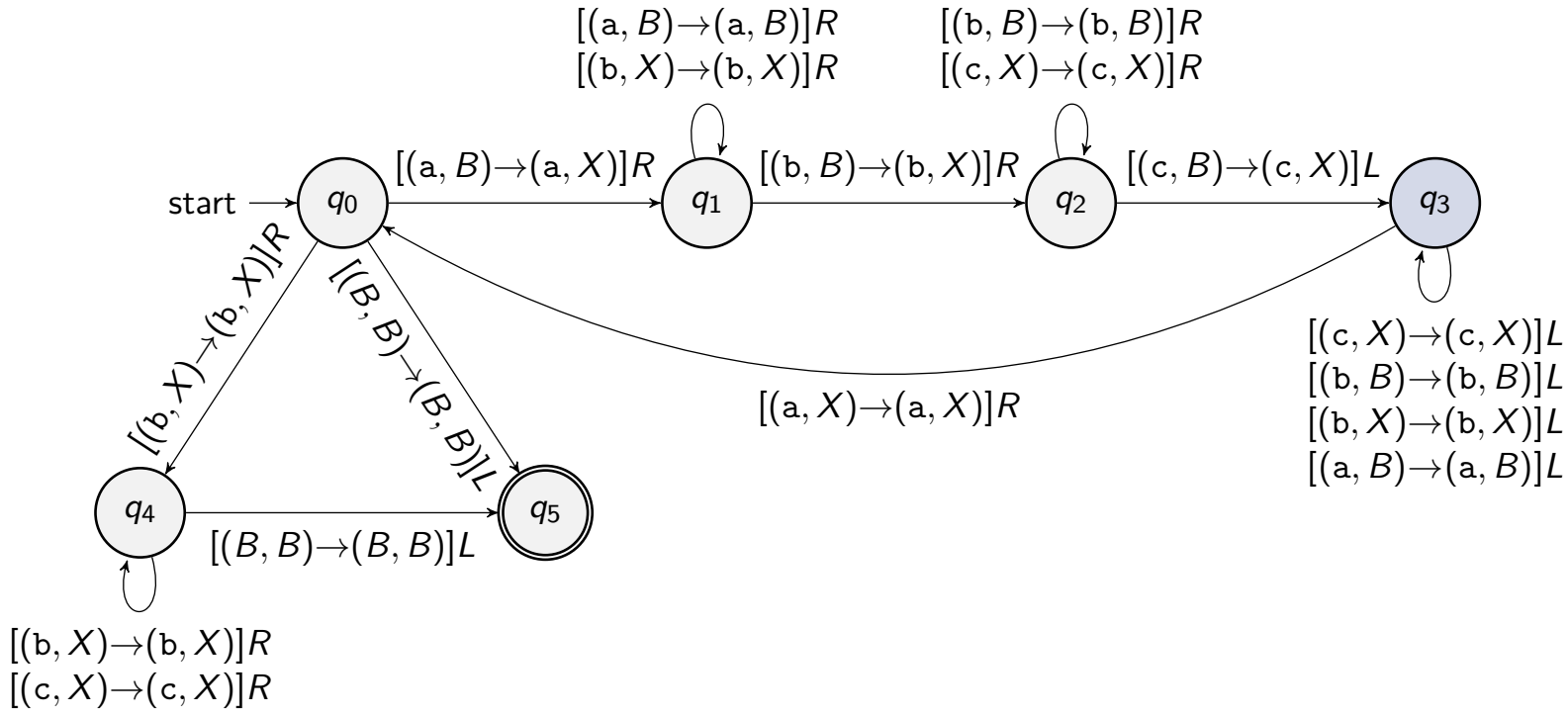
$\cdots$	B	a	a	b	b	c	c	B	$\cdots$
$\cdots$	B	X	X	X	X	X	X	B	$\cdots$



Construct a **multi-track TM** that accepts the language:

$$L(M) = \{a^n b^n c^n \mid n \geq 0\}$$

$\cdots$	B	a	a	b	b	c	c	B	$\cdots$
$\cdots$	B	X	X	X	X	X	X	B	$\cdots$



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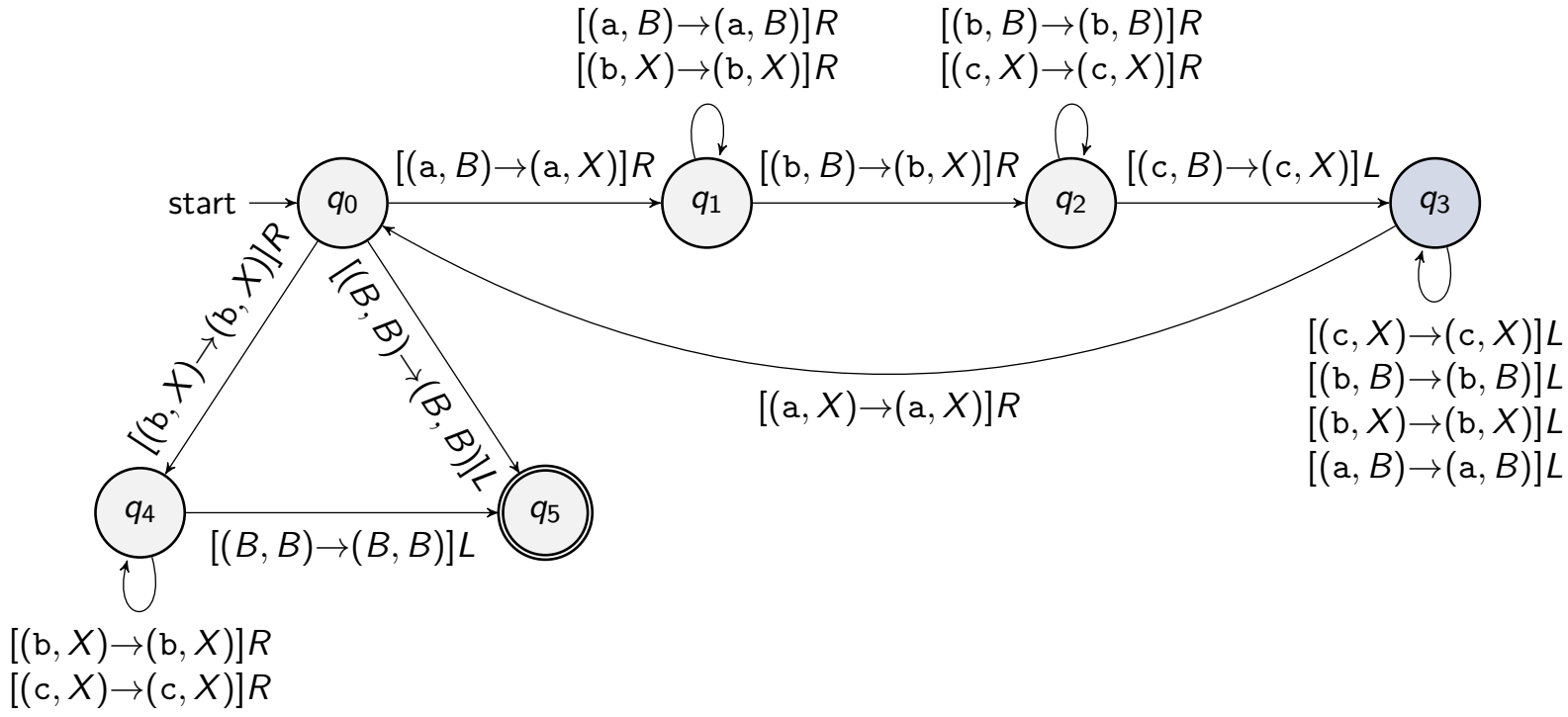
$$L(M) = \{a^n b^n c^n \mid n \geq 0\}$$

$\cdots$	B	a	a	b	b	c	c	B	$\cdots$
$\cdots$	B	X	X	X	X	X	X	B	$\cdots$



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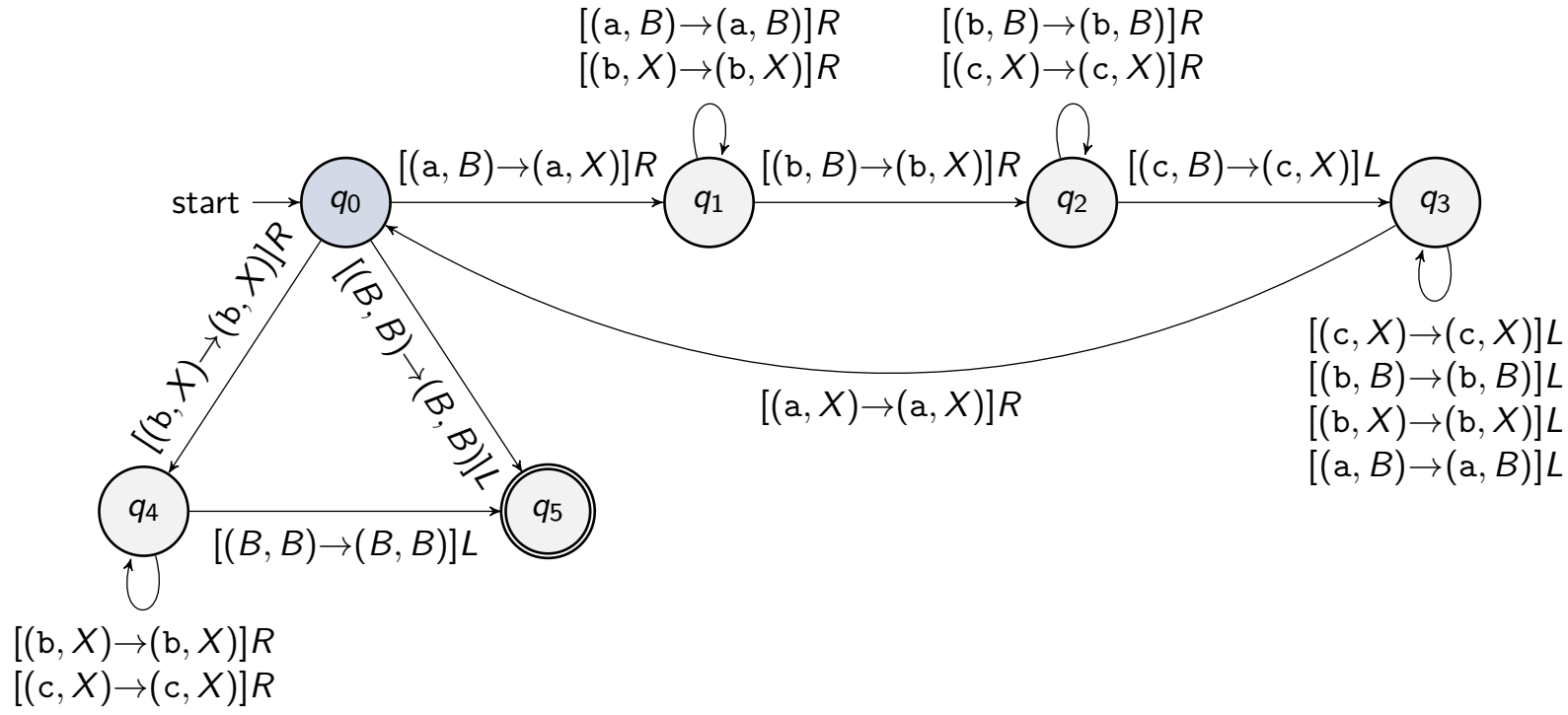
$$L(M) = \{a^n b^n c^n \mid n \geq 0\}$$

$\cdots$	B	a	a	b	b	c	c	B	$\cdots$
$\cdots$	B	X	X	X	X	X	X	B	$\cdots$

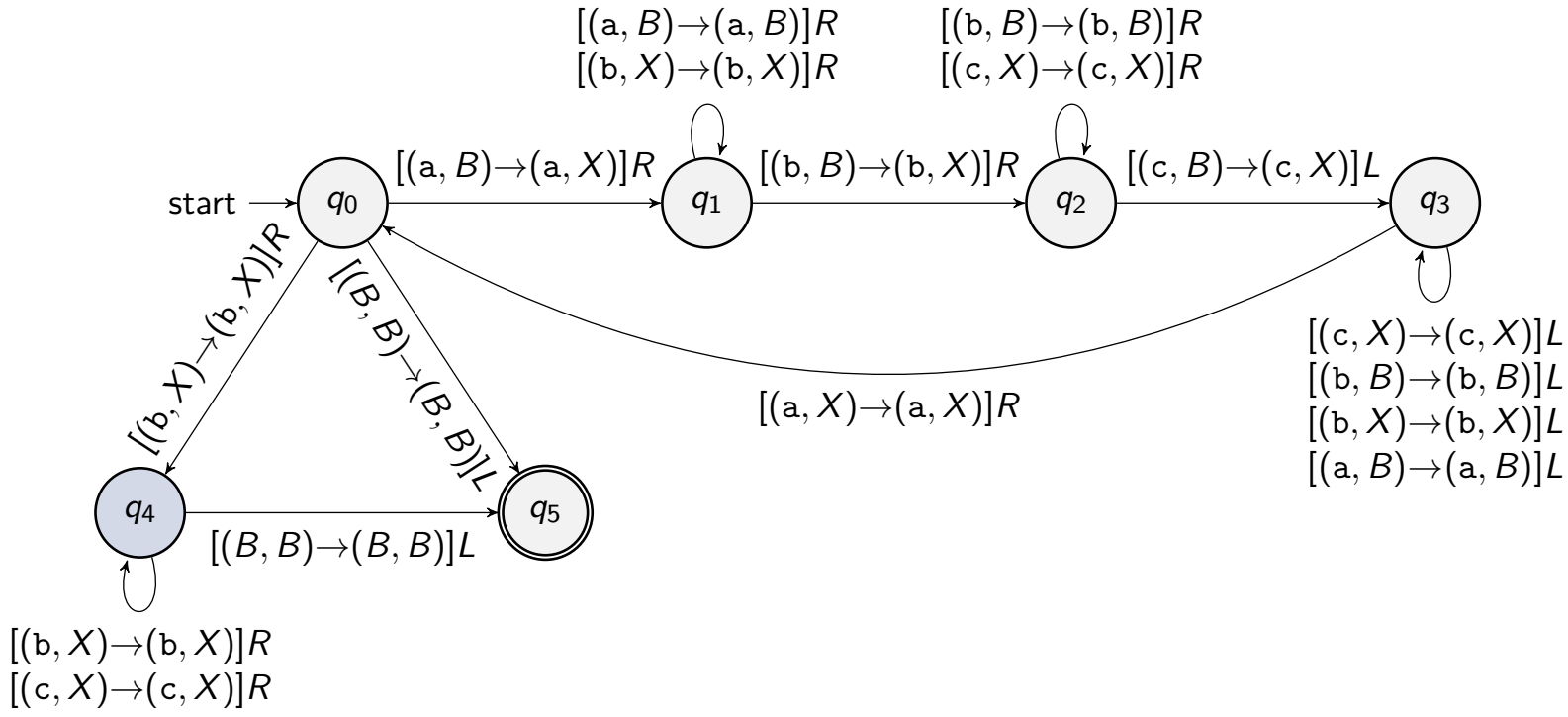


Now, no more unmarked a's. Check if all symbols are marked.

Construct a **multi-track TM** that accepts the language:

$$L(M) = \{a^n b^n c^n \mid n \geq 0\}$$

$\cdots$	B	a	a	b	b	c	c	B	$\cdots$
$\cdots$	B	X	X	X	X	X	X	B	$\cdots$



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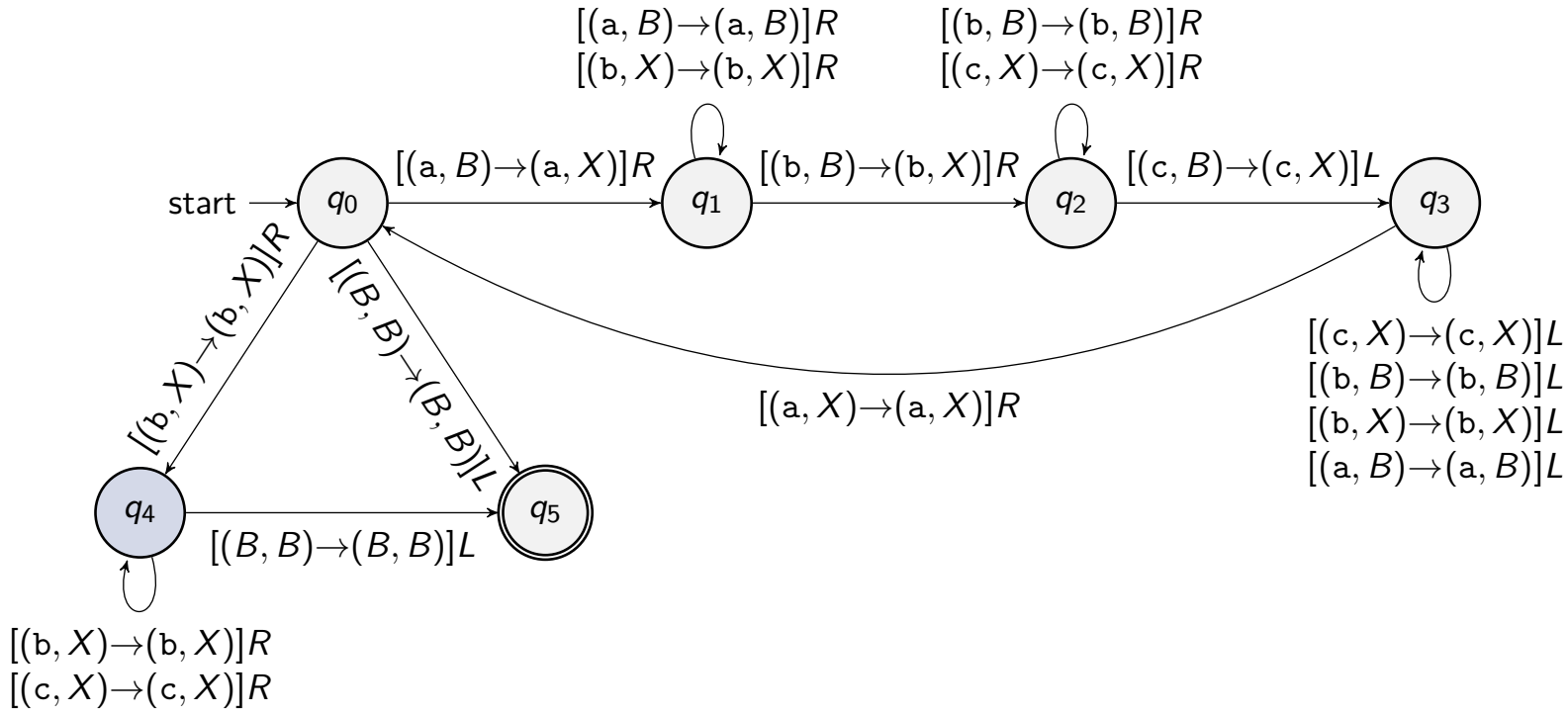
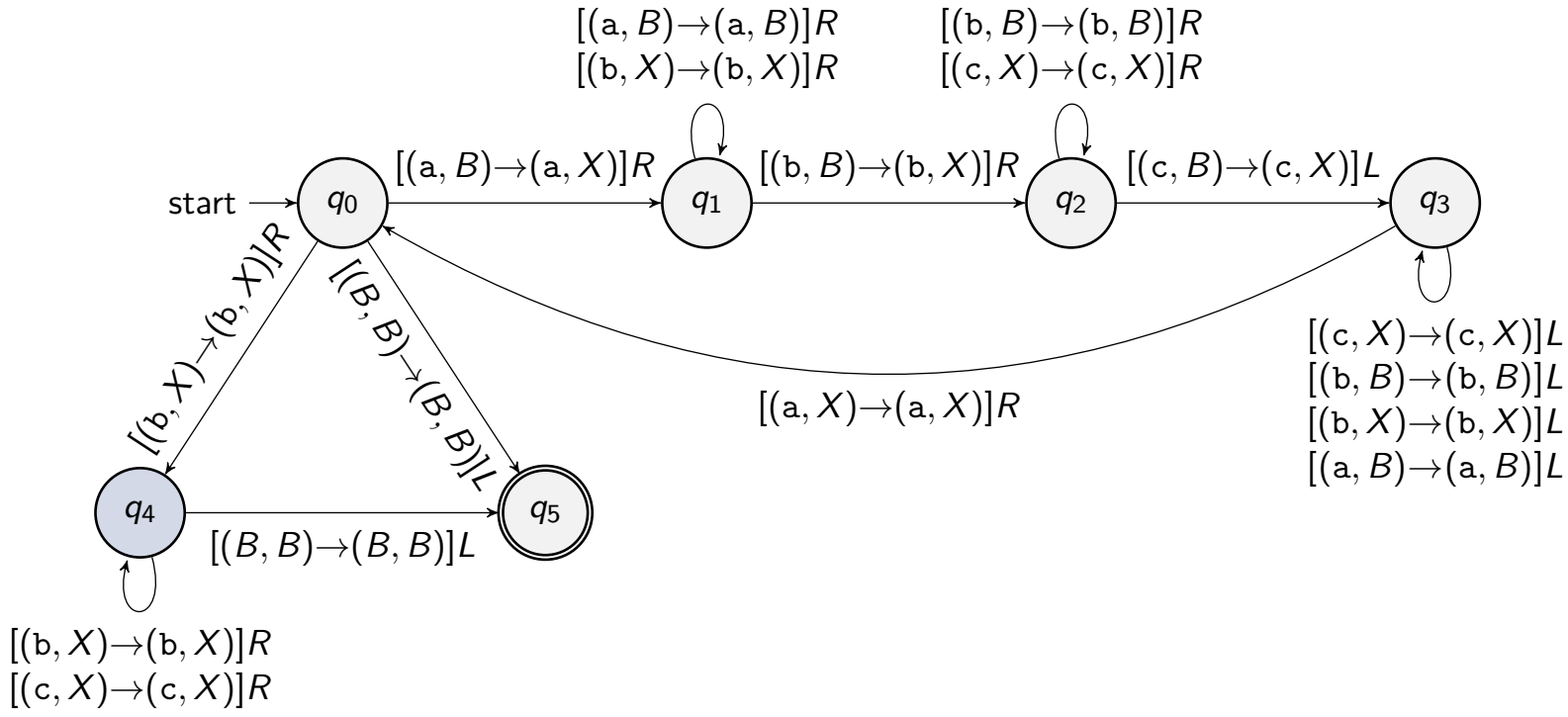
$\cdots$	B	a	a	b	b	c	c	B	$\cdots$
$\cdots$	B	X	X	X	X	X	X	B	$\cdots$



Construct a **multi-track TM** that accepts the language:

$$L(M) = \{a^n b^n c^n \mid n \geq 0\}$$

$\cdots$	B	a	a	b	b	c	c	B	$\cdots$
$\cdots$	B	X	X	X	X	X	X	B	$\cdots$



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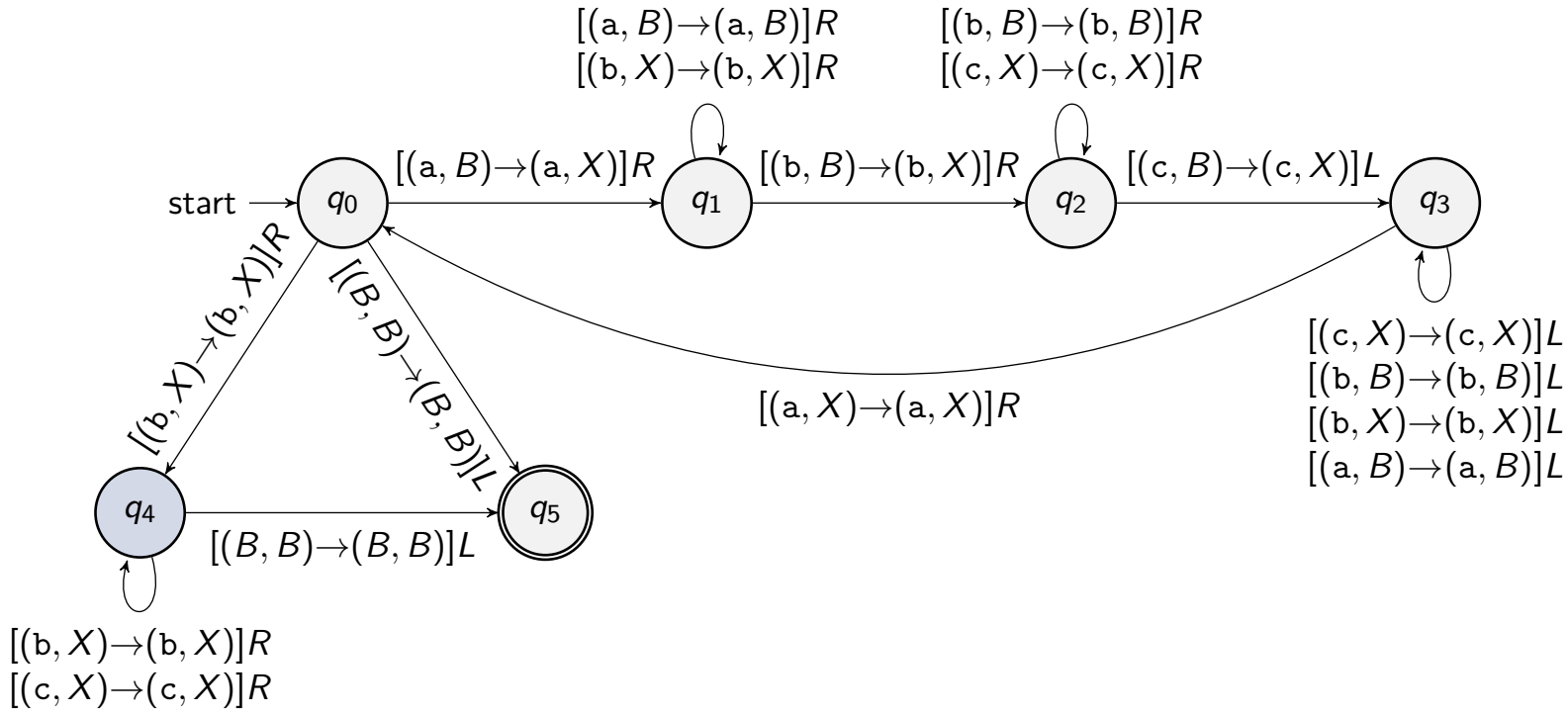
$$L(M) = \{a^n b^n c^n \mid n \geq 0\}$$

$\cdots$	B	a	a	b	b	c	c	B	$\cdots$
$\cdots$	B	X	X	X	X	X	X	B	$\cdots$



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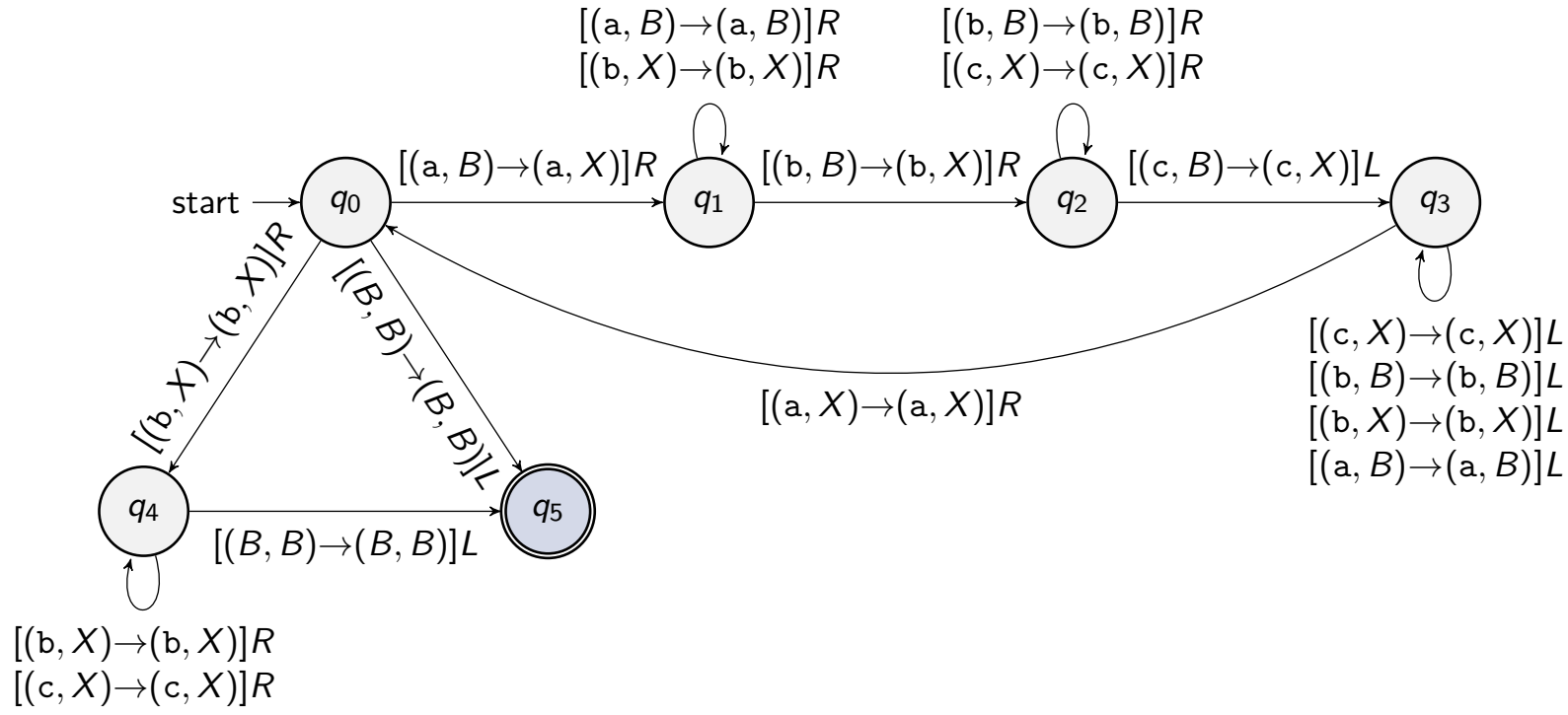
$$L(M) = \{a^n b^n c^n \mid n \geq 0\}$$

$\cdots$	B	a	a	b	b	c	c	B	$\cdots$
$\cdots$	B	X	X	X	X	X	X	B	$\cdots$



Accept!